National Institute of Environmental Health Sciences

Visual perception and mixed-initiative interaction for assisted visualization design

Author(s): Healey C, Kocherlakota S, Rao V, Mehta R, St Amant R
Year: 2008
Journal: IEEE Transactions on Visualization and Computer Graphics. 14 (2): 396-411

Abstract:

This paper describes the integration of perceptual guidelines from human vision with an AI-based mixed-initiative search strategy. The result is a visualization assistant called ViA, a system that collaborates with its users to identify perceptually salient visualizations for large, multidimensional datasets. ViA applies knowledge of low-level human vision to: (1) evaluate the effectiveness of a particular visualization for a given dataset and analysis tasks; and (2) rapidly direct its search towards new visualizations that are most likely to offer improvements over those seen to date. Context, domain expertise, and a high-level understanding of a dataset are critical to identifying effective visualizations. We apply a mixed-initiative strategy that allows ViA and its users to share their different strengths and continually improve ViA's understanding of a user's preferences. We visualize historical weather conditions to compare ViA's search strategy to exhaustive analysis, simulated annealing, and reactive tabu search, and to measure the improvement provided by mixed-initiative interaction. We also visualize intelligent agents competing in a simulated online auction to evaluate ViA's perceptual guidelines. Results from each study are positive, suggesting that ViA can construct high-quality visualizations for a range of real-world datasets.

Source: http://dx.doi.org/10.1109/tvcg.2007.70436

Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Public

Exposure :

weather or climate related pathway by which climate change affects health

Unspecified Exposure

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified